ALTAIR BASIC — UP AND RUNNING

In January, when Popular Electronics featured the Altair Computer on its front cover, we knew that we had a great product. But no one could have predicted the enormous flood of inquiries and phone calls and orders that started hitting us about mid-January.

Partly because the Altair has generated such a huge volume of business, we have been able to speed up our Altair development program and broaden our horizons somewhat. Undoubtedly the most newsworthy of these developments is the introduction of a BASIC programming language for the Altair Computer.

That's right. We've got BASIC and it's up and running!

People who are familiar with programming and BASIC language will most likely understand why we're making such a big deal out of this. For those who aren't familiar, we offer the following explanation.

A few years back, realizing that computers needn't be so darn complicated, a group of professors at Dartmouth College developed a revolutionary, new computer language called BASIC language. This language was designed so that people with little or no computer knowledge could learn how to program.

BASIC language works because it is just what it says--it is, namely, BASIC. For example, when you want to instruct the computer to

PRINT something and you are using BASIC language, you simply type the word PRINT on your terminal or teletype keyboard followed by whatever it is you want the computer to print. BASIC is BASIC. It is simple and understandable.

To illustrate this further, let's take a look at this sample BASIC program, designed to calculate a simple interest problem.

```
SCRATCH↵

10 LET P=650↵

20 LET T=18↵

30 LET R=.065↵

40 LET I=P*T*R/12↵

50 LET P1=P+I↵

60 LET M=P1/T ↵

70 PRINT "TOTAL INTEREST IS";I ↵

80 PRINT "TOTAL MONEY OWED IS";P1↵

90 PRINT "MONTHLY PAYMENTS ARE";M↵

RUN ↵
```

This program is a set of instructions to the computer telling it to answer some basic questions about a loan of $650.00 for 18 months at an add-on (simple interest) rate of 6 1/2%. These questions are: (1) What is the total amount of interest? (2) What is the total amount of money owed? and (3) What are the monthly payments?

While at this point the program may seem obscure to you, it will become clearer if we analyze each of its various components.

COMMANDS

Commands are direct orders to a computer that are executed immediately upon entry. The two commands in the preceding program are SCRATCH↵ and RUN↵. SCRATCH commands the computer to clear its memory of any unnecessary data and RUN commands the computer to RUN the program in its memory.

STATEMENTS

A statement is an instruction to the computer. It is executed only after a command has been given. The first statement in the preceding program is: 10 LET P=650↵. This statement instructs the computer to assign a value of 650 to P. As you may recall, 650 is the principal on the loan.

COMPUTER HISTORY

How many of you have heard of Charles Babbage?

Charles Babbage was an English inventor and philosopher who was blessed with an unusually fervent mind. In 1822, he proposed that the English government finance the construction of a massive machine which he called the "Difference Engine." This machine would be able to add, subtract, divide and multiply numbers and it would also be able to mechanically print the results!

Babbage somehow managed to raise 17,000 pounds, but two tons of brass, steel and pewter clockwork later, the project was abandoned as utterly hopeless.

Of course, Babbage wasn't discouraged enough to give up inventing number machines. In 1834 he was back with a new plan - this one bigger and better. He proposed the construction of an "Analytical Engine" that just happened to contain the basic elements of a digital computer.

The Analytical Engine had a memory called the "store" unit, a CPU called the "mill" unit, and a control unit. Furthermore, this Engine had two sets of instructions cards--one for mathematical opera-

tions and another consisting of variables and constants.

Unfortunately, Babbage was unsuccessful in raising the bread for this second project. "You're just not practical, Babbage," is what his legislative friends said.

The point of this is simply that computer history is fun. You can't exactly produce a year by year calendar of events since the invention of the abacus in 450 BC, however, there is certainly some enlightening material.

One of the most enlightening books about computers is the textbook, Computers and Society by Stanley Rothman, published by Science Research Associates. This book attempts to address itself to the impact computers have had and will have on society. It is filled with good general information and has a very readable format.

If any members of the Altair Users Group would like to write an article on computer history, we'd be more than glad to publish it with full credit.

--DB

Across the Editor's Desk

David Bunnell, editor

According to our figures, 2% of the world's general purpose computers are now Altair 8800's. And the Altair's only been on the market since January.

It's been a fascinating first quarter, to say the least. At a time when the country is in the throes of a deep recession, business at MITS has been great.

So you might say that the theme of this first edition of Computer Notes is "let's keep the ball rolling."

One way to implement this theme is through the development of software. Altair BASIC is certainly a good start, but we need to start building a comprehensive Altair Software Library.

That's where you come in.

To motivate members of the Altair Users Group to send in their programs for inclusion in the library, MITS is sponsoring a very attractive "SOFTWARE CONTEST."

In the next issue of Computer Notes, we will be awarding a prize of $50.00 credit toward the purchase of an Altair or Altair options to

Boo-Boo's

In that simple sample in the Operator's Manual on pages 33-38, we forgot to put in that you must operate it from Loc 0, and the easiest way to do that is to RESET before you run. To examine the results, hit STOP, put the address you stored in the ADR switches. If you want to run again, RESET & RUN. I always use this RESET to start from Loc 0. It's the easiest way.

There is a mistake on some of the back pages of the Operator's Manual. It shows two instructions with code of 353. The code for PCHL is 351 and XCHG is 353.

As most of you know, we had a shipping boo-boo with our kits. About 100 units got out with a 7812 voltage regulator instead of a 7805. That's a 12v regulator instead of a 5v. If any of you have received them and haven't been notified, let us know and we'll send you the right one immediately. Only kits were affected.

the author of the best "major program." Other prizes include $25.00 credit to the author of the best subroutine. (see page 4 for details)

Another way to keep the ball rolling is by the development of new Altair Options and System Packages. Our "NEW PRODUCTS" section features a line printer, teletype and floppy disk system and we are also using Computer Notes to introduce our BASIC language systems.

Computer Notes is really the tool for communicating all this good news and also, as you can see by reading this newspaper, to let you in on "boo-boo's" we have made, give you technical advice and general computer information.

We'll need some active participation on the part of Altair Users to make this publication a real success. Feel free to write to us with your comments and advice.

The next issue will come out in June. The way things have been going, we'll have tons of good news for you then.

ALTAIR SERVICE DEPT.

Barbara Sims

Greetings from the Altair Special Services Department. I'm Barbara Sims. Now that you own an Altair 8800, I'll be talking with you when you phone, or write, in for help with your minicomputer. Paul Van Baalen will be the engineer in charge of our Customer Service Department, which includes the Special Services. Between the two of us we hope to answer any questions you might have. Our department will also be in charge of handling customer problems, taking care of any additions to your 8800, and trouble shooting your unit.

In the near future we hope to have a special phone number for 8800 owners to use when calling the Altair Service Desk. This should speed matters up when you have questions concerning your minicomputer.

Here's wishing you a fantastic future with your Altair 8800 mini-computer.

Software

by Harvey Lee

Although this column is designed primarily for the benefit of the beginning programmer, much of the information will also be of value to the more experienced programmer. Any Altair 8800 peculiarities, items of interest from the Altair Users Group Library and examples of programs will be included along with guidelines on basic programming skills.

For example, the normal use of the HLT (halt) instruction is discussed in the Altair 8800 Operator's Manual. If HLT is used in a program in which no interrupts occur, the computer becomes inoperative, and it

Harvey Lee

would seem necessary to turn the computer off then back on to restore operation. This zaps the memory. The computer can be cleared by holding the STOP/RUN switch in the STOP position while moving the RESET/CLEAR switch to RESET and releasing, thus saving the memory.

An error has been discovered in the Altair 8800 Operator's Manual on page 65. The LXI (Load Register Pair Immediate) instruction loads the first byte of data (the least significant 8 bits) into the second register of the specified pair and loads the second byte of data (the most significant 8 bits) into the first register of the specified pair. Early editions of the manual had this order of loading reversed (it has since been corrected).

By relieving man of dull, repetitive tasks, providing him with information and instructions and by solving problems, the computer of the future will be a steam engine as applied to the mind.

CONTINUED FROM PAGE ONE--ALTAIR BASIC - UP AND RUNNING

LINE NUMBERS

A line number is placed at the beginning of each statement. It does two things. First, it tells the computer not to execute the instruction that follows until a command has been given and second, it gives order to the execution of the statements in a program. Following the entry of a command, the first statement to be executed is the one with the smallest line number, then the next smallest and so on.

RETURN (↵)

Each statement and each command in a program is ended by the depression of the RETURN key. The symbol ↵ represents pressing this key.

LET Statements

The first six statements in our example program are LET statements. The LET statement is used to assign a number called a value to an abbreviated code called a variable. In the first LET statement, the value of 650 is assigned to the variable, P. The value in a LET statement can be a single number or it can be the result of a computation as it is in statement 40. (LET I=P*T*R/12 ↵)

A variable will retain the value assigned to it throughout the program unless you change the value. Once a value has been assigned to the variable P; P can be used to represent this value throughout the remaining program statements.

In view of what we now know about LET statements, let's analyze the six LET statements in our example program:

10 LET P=650 ↵

This LET statement assigns the value, 650, to the variable, P. $650 is the amount of the principal of the loan.

20 LET T=18 ↵

This LET statement assigns the value, 18, to the variable, T. 18 months is the amount of time you have to pay off the loan.

30 LET R=.065 ↵

This LET statement assigns the value, .065, to the variable, R. The rate of interest is 6 1/2%, which converts to the decimal .065.

40 LET I=P*T*R/12 ↵

This LET statement assigns the value, P*T*R/12, to the variable, I. "*" is the symbol for multiplication and "/" is the symbol for division. Interest on the loan is equal to principal times time times rate. We

divide this answer by 12 because the value we have entered for time is 18 (statement 20) and the interest formula calls for time to be in years.

50 LET P1=P+I ↵

This LET statement assigns the value, P+I, to the variable, P1. The total payment is equal to the principal plus the interest.

60 LET M=P1/T ↵

This LET statement assigns the value, P1/T, to the variable, M. The monthly payment is equal to the total payment divided by time.

PRINT Statement

The last three statements in the example program are PRINT statements. A PRINT statement can instruct the computer to display a "string literal" -- a "string" of characters enclosed within quotation marks in the PRINT statement.

PRINT statement 70 instructs the computer to print "TOTAL INTEREST IS" followed by the value of I. PRINT statement 80 instructs the computer to print "TOTAL MONEY OWED IS" followed by the value of P1 and statement 90 instructs the computer to print "MONTHLY PAYMENTS ARE" followed by the value of M.

This BASIC program is rather limited as far as programs go. By the use of a READ statement, it can easily be modified to solve any simple interest problem, not just the above loan of $650.00. However, our sample program does illustrate some of the principals of BASIC programming.

In addition to being easy to learn and to use, the Altair BASIC language software is also very powerful. It has transidental math functions that allow you to use the computer like an advanced, scientific calculator and it has powerful looping instructions such as GOTO, GOSUB, IF and THEN that allow you to write very sophisticated programs.

There are two keys to the new computer revolution. One is computers must be inexpensive and the other is computers must be understandable. With the Altair 8800 and Altair BASIC, both of these criteria have been met.

Altair BASIC contains the following statements:

PRINT	ON
IF	STOP
THEN	DATA
GOSUB	RESTORE
RETURN	LET
NEXT	DIM
FOR	REM
READ	LIST
INPUT	CLEAR
END	SCRATCH

Altair BASIC also contains the following functions:

RND	RND
SIN	SQR
COS	INT
LOG	FRE
EXP	AND
TAN	ABS
ATN	SGN

Software Prices......

Altair BASIC language........$500.00

When purchased with an Altair, 8K memory and either a serial I/O board or an audio-cassette interface (no copy fee).........$75.00

Altair EXTENDED BASIC*.......$750.00

When purchased with an Altair, 12K memory and either a serial I/O board or an audio-cassette interface (no copy fee).........$150.00

SOFTWARE PACKAGE ONE (resident assembler, text editor, and system monitor)**...................$500.00

When purchased with an Altair, 8K memory and either a serial I/O board or an audio-cassette interface..........FREE binary listing

($30.00 copying fee on audio-cassette or paper tape)

*EXTENDED BASIC is Altair BASIC with logical operators, double precision arithmetic, PRINT USING, string capability, etc. More on this in the next issue.

**A resident assembler allows you to write machine language programs using mnemonics. A text editor allows you to make corrections to a program as you write it. A system monitor is a housekeeping routine that monitors system conditions and allows you to communicate with peripherals without manual boot strapping, etc.

New Products

OKIDATA CP 110 LINE PRINTER

PRINT CHARACTERISTICS:

Print Method. Impact Dot Matrix. Dot Size. 0.015" Character Height. 0.105" 7 verical pins on 10 degree slant. Character Width. 0.075" 5x7 Matrix. Character Spacing. 10 characters/inch. Line Width. 80 characters. Font. 64 character ASCII subset standard; other optional.

PRINT MECHANISM:

Head Motion. Print head moves uniformly in both directions and pauses only at end of line. Individual characters are printed on the fly. Print Speed. 110 characters/second. Throughput. 70 lines per minute Bi-directional printing.

PAPER MECHANISM:

Line Spacing. 6 lines/inch. Feed Rate. 180 millisecond single space 420 line/minute Slew.

INPUT POWER:

Voltage. 100, 110, 117, 235 VAC +/- 10%, 50 or 60 Hz selected at input transformer taps. Power. 350 watts maximum.

SAVE $200.00. Until April 30, 1975, members of the Altair Users Group can buy this line printer for $200.00 less than the listed retail price (see price list).

4 ALTAIR SYSTEMS

*ALTAIR BASIC I
Altair 8800 Computer
2 4K Dynamic Memory Boards
Comter II (32 character, self-scan display Terminal with built-in Audio Cassette Record Interface)
Serial Input/Output Card
and Connectors
Cooling Fan
BASIC Software

*ALTAIR EXTENDED BASIC II
Altair 8800 Computer
3 4K Dynamic Memory Boards
Comter II Terminal
Serial Input/Output Card
and Connectors
Cooling Fan
Extra Mother Board
EXTENDED BASIC Software

*ALTAIR DOS/BASIC III
Altair 8800 Computer
4 4K Dynamic Memory Boards
Comter II Terminal
Serial Input/Output Card
and Connectors
Cooling Fan
Extra Mother Board
Disk Controller
2 Disk Drives
EXTENDED BASIC and
DOS Software

ALTAIR EXTENDED Engr/Acctg IV
Altair 8800 Computer
8 4K Dynamic Memory Boards
Teletype ASR-33
Line Printer (110 characters per second—includes controller)
Serial Input/Output Card
and Connectors
Cooling Fan
3 Extra Mother Boards
Disk Controller
2 Disk Drives
EXTENDED BASIC and
DOS Software

*Teletype ASR-33 can be substituted for Comter II Terminal—See Price List

COMPUTER TRADE-IN

If you have a Mark 8 or a Shelby or an M16 National Computer and you would rather have an Altair 8800, we will offer you $150.00 on a trade-in.

For an Altair Computer kit, send in your used computer plus a check for $297.00 ($439 minus $150 plus $8 for postage and handling). For an assembled unit send your used computer plus a check for $479.00.

ALTAIR FLOPPY DISC

88-DISK Disk Drive — Consists of Pertex FD 400 floppy disk drive, power supply (110-125v AC, 60 Hz), cooling fan, disk buffer and address select electronics in Optima case similar to Altair Computer case. Capable of storing up to 300,000 words on a flexible disk. Disk included. Up to 16 disk drives can be controlled by one 88-DC Disk Controller.

88-DC Disk Controller — The 88-DC Disk Controller consists of two circuit boards. It electronically sectors each track on the disk into eight groups of 512 words. (Each disk has 77 tracks). Capable of controlling up to 16 Disk Drives.

ACR-33 Teletypes NOW AVAILABLE (see Price List)

Software Contest:

Members will be encouraged to submit programs for the *Altair Library*. These programs will be one of two categories: A. Subroutines, and B. Major Programs. All programs will be screened and tested by MITS.

Once a program has been found to be acceptable, it will be included in the *Altair* library and a description of the program will be printed in the User's Club newsletter. The author of the program will be entitled to a free printout of any two programs from the *Altair* library.

There will be prizes awarded to the authors of the best programs. The prize for the best "major program" (announced in each newsletter) will be **$50.00 credit** toward the purchase of an *Altair* or Altair options. Second prize will be **$25.00 credit** and third place will be **$15.00 credit**. The author of the best "subroutine" will receive **$25.00 credit**. Second prize for a "subroutine" will be **$15.00 credit**.

A grand prize of **$1000.00 credit** will be awarded each year to the author of the overall best "major program." A prize of **$250.00 credit** will be awarded to the author of the best "subroutine."

MITS employees and their families will be encouraged to be members of the *Altair User's Club*, however, they will not be eligible for prizes. Contest void where prohibited by law.

Note: When you submit a program make sure that it is legible (type written preferred). For machine language or assembly language programs, submit (from left to right) a tag (optional), mnemonic, address, octal code and explanation (optional) for each program step.

Program submission forms are available from MITS for $2.00 per 50. This price includes postage and handling.

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MAINTENANCE OPTIONS

Below you'll find the two maintenance options that are available at the present time. We do have plans to have service centers throughout the country, but this is probably a year or so down the line.

I.   Time and materials--$22.00/hour plus retail parts cost.

II. Maintenance contract--a person may apply for and receive a contract on an assembled unit within the 90 day warranty period. After this 90 day period the machine must be returned for checkout before a contract will be issued. Either party may cancel upon written 30 day notice to the other party.

Time and materials will be charged in all cases for repairs incurred during factory check out. However the check out itself is free if contract is issued.

Customer pays freight both to and from MITS for repairs and check out. MITS reserves the right to replace any portion of the machine with new or reconditioned parts at their option to expedite repair.

Maintenance contracts will be voided upon evidence of unauthorized modification to any part of the machine, misuse of the machine, or acts of God. (i.e. time and material will be charged)

CASE (includes Power Supply and
      Display Control Board, and
      CPU Board) $11.00/month

88-MCS	--	3.00 month
88-1MCS	--	3.00/month
88-4MCD	--	4.00/month
88-SIOA	--	2.00/month
88-SIOB	--	2.00/month
88-SIOC	--	3.00/month
88-PIO	--	2.00/month
88-ACR	--	3.00/month

Prices on other equipment and options will be announced in later issues. Maintenance not provided for customer-designed interface without negotiation.

Requests for maintenance contracts or inquiries about same should be directed to Paul Van Baalen.

Example program demonstrating the use of LXI instructions

Memory address and Octal Codes for the instructions have been included for those who wish to try the program.

Memory Address	Octal Code	Mnemonic	Explanation
000	001	LXI B	Load immediate register pair B,C
001	377		B with 000 octal, C with 377 octal
002	000		
003	041	LXI H	Load immediate register pair H,L
004	200		H with 000 octal, L with 200 octal
005	000		
006	165	MOV M,L	Move contents of Register L to memory location specified by registers H,L. In this case, location 200 octal.
007	043	INX H	Increment H,L by 1
010	164	MOV M,H	Move contents of Register H to Memory location specified by H,L. In this case, location 201 octal.
011	043	INX H	Increment H,L
012	160	MOV M,B	Move contents of B to Memory specified by H,L. Location 202 octal.
013	043	INX H	Increment H,L
014	161	MOV M,C	Move contents of C to Memory. Location 203 octal.
015	043	INX H	Increment H,L
016	165	MOV M,L	Move contents of L to Memory. Location 204 octal.
017	303	JMP	Jump to Memory Address 000 octal and continue execution. This will cause the computer to cycle through the program until the STOP switch is activated.
020	000		
021	000		

Upon examination, the following memory addresses should have the corresponding data: (numbers are in octal)

Address	Data	Corresponds to:
200	200	Data loaded into Register L
201	000	Data loaded into Register H
202	000	Data loaded into Register B
203	377	Data loaded into Register C
204	204	Data in Register L after execution of all the INX H instructions.

If a HLT instruction were used to replace the JMP instruction, the computer would halt execution to wait for an interrupt to occur. This can be cleared as previously described.

Altair Technical hints

USING THE STACK

The stack is a portion of memory the programmer sets aside for temporary storage of data or addresses. The stack is necessary for the proper execution of many instructions. The Stack Pointer is a 16-bit register that specifies the address in the stack that will be operated upon.

To establish the stack use the LXI SP instruction. The data byte immediately following the instruction has the least significant 8 bits of the address, and the next data byte has the most significant 8 bits of the address. For example:

    LXI SP   sets the stack pointer
    077,000   at memory address
                 000 077 octal.

There are two basic operations on the stack, the PUSH and the POP. The PUSH instruction moves the contents of the specified register pair into the stack. The first register of the specified register pair goes into the stack at the address in the stack pointer minus 1 and the second register at the address in the stack pointer minus 2. The stack pointer is then decremented by 2. For example:

    PUSH D   with the stack pointer
                 at 077 octal would move
                 the contents of register D to memory address
                 076, E to 075 and then
                 set the stack pointer
                 to 075.

The POP instruction is the reverse of the PUSH. So the content of the stack at the address contained in the stack pointer is moved into the second register of the specified register pair. The content of the stack at the address contained in the stack pointer plus 1 is moved into the first register of the specified pair. The stack pointer is then incremented by 2. For example:

    POP D   with the stack pointer
                 at 075 octal would move
                 the content of 075 to
                 register E, 076 to register D and then set
                 the stack pointer to 077.

In addition to these instructions the stack pointer may be operated on by many of the register pair instructions.

When programming remember the following:

1) If an instruction requires a stack for proper execution be

Updated Price List

	MITS ALTAIR 8800	PRICE LIST		
PART NUMBER	DESCRIPTION	KIT	ASSEM	DAYS DELIVERY
Computers, Terminals & Line Printer				
*8800	Altair 8800 Computer	— $ 439.00	$ 621.00	60
COMTER II	Terminal w/Built in Audio Cassette I/O	780.00	920.00	60
CT-256	Comter 256 Terminal	745.00	885.00	45-60
CT-256	Comter 256 in Aluminum Suitcase	--	965.00	90
CT257, 8 or 9	Pages 2, 3 or 4 for CT-256	96.00	105.00	45-60
CT-8096	CRT Terminal	TBD	TBD	JUNE
88-VLCT	Low Cost Terminal	129.00	169.00	45-60
88-80LP	Line Printer & Controller, 110 char/sec	1,750.00	1,975.00	90
88-TTY	Teletype ASR-33	1,500.00	1,500.00	60-90
Memory				
88-MCS	256 words memory--Exp to 1K with 88-MM	—103.00	134.00	60
88-MM	Adds 256 words to 88-MCS	— — 53.00	61.00	60
88-1MCS	1K Static Memory	176.00	209.00	60
88-4MCD	4K Dynamic Memory	264.00	338.00	60
88-DCDD	Disc Controller, 1 Disc Drive & Multiplexer	1,480.00	1,980.00	60
88-DISC	Disc Drive in cabinet with added Multiplexer	1,180.00	1,600.00	60
88-DMAC	Direct Memory Access Controller	98.00	149.00	90
88-DMAE	Direct Memory I/O Channel--External	126.00	186.00	90
88-DMAI	Direct Memory I/O Channel--Internal	123.00	183.00	90
88-ACR	Audio Cassette Record Interface	128.00	174.00	60
I/O and Expansion Devices				
88-PIO	Parallel I/O	92.00	114.00	60
88-SIOA	Serial I/O RS-232 compatible	— 119.00	138.00	60
88-SIOB	Serial I/O--TTL	124.00	146.00	60
88-SIOC	Serial I/O--TTY	124.00	146.00	60
*88-EC	Expander Mother Board (adds 4 slots to 8800)	16.00	31.00	60
88-EBC	Expander Cabinet (add'l case, P/S, etc. for 16 slots)	394.00	485.00	60
88-EXC	Extender Card	57.00	83.00	60
Miscellaneous				
88-VI	Vectored Interrupt	126.00	179.00	60
88-RTC	Real Time Clock	53.00	84.00	60
88-ACC	Altair Cyclops Camera	180.00	235.00	90
88-CCC	Camera Controller Card	260.00	340.00	90
88-KB	ASCII Keyboard	198.00	254.00	60
88-32OU	32 char Alpha/Numeric Display	438.00	549.00	60
88-PPCB	Prototype P.C. Board	57.00	84.00	60
88-FAN	Cooling Fan	16.00	20.00	15
88-25OB	Pr. Connectors--1 each 7325-DB25P & S + cover	11.00	11.00	15
MS-416	MitScope--4 channel scope	127.00	189.00	
PROM				
88-PMC	PROM Memory Card	76.00	128.00	90
88-PROM	PROM'S	42.00	57.00	90
88-PPC	PROM Programmer Card	324.00	420.00	90

Suggested Systems

System 6			-- $5,297.00		90
I	ALTAIR Basic I	Price	2,393.00	2,896.00	60
		Less Discount	-425.00	-425.00	
		YOUR COST	1,968.00	2,461.00	
II	ALTAIR Extended Basic II	Price	2,950.00	3,531.00	60
		Less Discount	-725.00	-725.00	
		YOUR COST	2,225.00	2,806.00	
III	ALTAIR DOS/Basic III	Price	6,374.00	7,949.00	90
		Less Discount	-1,300.00	-1,300.00	
		YOUR COST	5,074.00	6,649.00	
IV	ALTAIR Extended Engr/Acctg IV	Price	10,002.00	11,989.00	120
		Less Discount	-1,500.00	-1,500.00	
		YOUR COST	8,502.00	10,489.00	

Software   With Minimum System:

Package 1	$500.00	+ 8K memory, I/O	Free Binary (on tape $30.00)
BASIC	500.00	+ 8K memory, I/O & terminal	$ 75.00
EXT. BASIC	750.00	+ 12K memory, I/O & terminal	150.00
DOS	500.00	n/a	
User's Group	30.00/yr.	Free with 8800	
		(Foreign--add $5.00 airmail postage)	

Miscellaneous Parts

(A)	3 Chip Package (Microprocessor & 2 memory)	$250.00	--	10
(B)	Set 4 P.C. Boards			
	(1 ea. CPU, Exp., Memory & Front Panel)	73.00	--	30
(C)	P/N 88-CPU Complete CPU Board	310.00	360.00	60

**Manuals - Terminal CT-256

Operators	$ 6.50
Assembly	10.00
Theory of Operation, Schematics & Trouble Shooting	10.00

**Manuals - Altair 8800 Computer

Operators	7.50
Assembly	9.00
Theory of Operation, Schematics & Trouble Shooting	9.00
One year up-date to theory manual	10.00

**Manuals - Peripherals

Combination Operators & Assembly (each)	5.00

Postage & Terms

- Terms: Cash with order, Mastercharge or Bankamericard
- Postage & Handling:
  1) Add $8.00 each for Terminal, Computer, Line Printer, Teletype and Disc
  2) Add for Peripherals:
     (a) -0- if ordered with computer
     (b) $3.00 if ordered separately
  3) Add $1.00 postage for Chip Package & P.C. Board Set
  4) Postage included in price of manuals
  5) Canada, Hawaii & Alaska, postage charges subject to quotation.

(*)Note:　Basic unit has 4 slots available, one of which is used up with CPU Board. When ordering more than 3 added peripherals, added 88-EC required for each 4 peripherals.
(**)Note:　Manuals are included at no cost with purchased units.
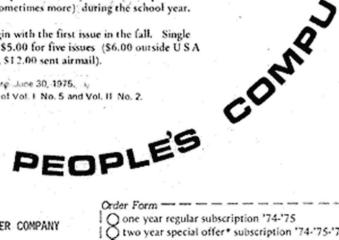*Prices, specifications and delivery subject to change.*

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USING THE STACK

sure to provide it. (For example, the stack is necessary when using subroutines.)

2) There should be a POP instruction for every PUSH instruction. (The stack is for temporary storage.)

3) The stack pointer moves down through memory as data is added to the stack and back up as data is removed. Be sure to allow sufficient memory for the maximum possible requirements of the stack.

ATTENTION KITBUILDERS

There are 4 holes on some of the Display Control boards which have been drilled out to accommodate a heavier gauge wire. This means that you as the kitbuilder will have to solder the wire on both sides of the board to assure power and ground get to the necessary places. The holes involved are labeled AC SW, GND and (+8V).

A TALKING COMPUTER???

One of the most obvious problems in programming a computer to listen and comprehend the spoken word is that a computer cannot see the situation. The way in which something is said, the gestures and expressions of the person saying it has great bearing on the meaning.

There is a program, the GENIE program, which has successfully taught a computer to take instructions in ordinary language. Of course, the vocabulary is rather small, but the computer has a 90% chance of complete understanding.

According to Edmund C. Berkeley, the editor of Computers and People, there are five criteria for successfully programming a computer to understand spoken language. These are:

1. Recognition of a framework of a sentence.
2. Recognition of synonyms and word groups.
3. Understanding of context.
4. A vocabulary of 300-500 words.
5. Variation in the way something has been stated.

Berkeley further claims that each of these criteria have been met in separate programs. That combining them in a single program is not far away.

A talking computer? It's something to talk about.

Q and A

Q. What do I need to hook my Southwest Technical Products CT1024 to my ALTAIR?

A. You need a CT-S serial interface from Southwest Tech and a SIOA interface from MITS.

Another possibility that we believe will work is a 68-PIO from MITS and a CT-L parallel interface from Southwest.

Q. What do I do about a short routine or subroutine that doesn't do what I want it to?

A. Send it to our service desk -- we won't rewrite it for you but we will tell you what you are doing wrong.

Q. What kinds of hardware problems have you been experiencing with the 8800?

A. The problems at this point have been only in kits and have been primarily solder bridges and cold solder joints in the ground or power circuits. Point of interest: Of 1000 units in the field, only 13 have been returned to date. Five of these have been at the request of the repair department to investigate potentially serious problems. P.S. They weren't serious.

Q. How many options can I put in my ALTAIR 8800 before I have to beef up the power supply?

A. There are 16 slots in the basic chassis. One of these is taken up by the CPU board. The other 15 can be filled in any manner (memory, I/O, etc.) to satisfy the user's requirements.

Q. How do I use the sense switches?

A. Sense switches are inputted to AREG by an input 303 from DEVICE 377. After this the data may be manipulated in any fashion that you choose.

Q. What does MITS have in the mill as a mass storage device priced between the Audio Cassette and the Floppy Disk?

A. We do have a mag tape system in the planning stages right now, and will be announcing more on it in future newsletters.

Q. How can I contact other Users Group members?

A. If you will send a letter to Barb authorizing her to publish your name to other users, we'll have these names printed in future newsletters.

Q. When am I going to get more information on the floppy disk and line printer?

A. Look at the "New Products" page in this newsletter. (page 4)

Q. I've seen bits and pieces about software available for the 8800. What's the full story?

A. See page 3 for software details and prices.

ALTAIR CHECKOUT PROCEDURE

1. BEFORE APPLYING POWER VISUALLY (WITH THE AID OF A MAGNIFYING GLASS IF POSSIBLE) CHECK FOR SOLDER BRIDGES, COLD SOLDER JOINTS, BROKEN LANDS AND/OR WIRES AND CORRECT ORIENTATION OF COMPONENTS. 97.37452% OF ALL FAILURES CAN BE CAUGHT DURING THIS STEP.

2. With the pluggable boards out of the machine, power it up and check the terminal boards for the proper input voltages.
Check the bus for +5 volts (pins 1 & 51), +15 volts (pin 2), -15 volts (pin 52), and ground (pins 50, 100).
With the boards out these should reach as follows:
(Use negative side of power supply electrolytic capacitors as ground.)

Pins 1 & 51	+10 VDC	
Pin 2	+20 VDC	approx.
Pin 52	-17 VDC	
Pins 50, 100	-0V	

Now check that none of these voltages are seen on pins adjacent to the above checked pins.

NOTE: IN NO CASE REMOVE OR INSTALL ANY BOARDS WITH POWER ON.

3. After powering the machine down, install the boards and check the output of the voltage regulators for +5VDC. Also check the output of the 12V zener on the CPU board for +12VDC.
Assuming everything above is kosher, you should now power the machine down; install the CPU plug and power it back up. The machine comes up in an undetermined state, so what you do is hold the STOP switch in the stop position and give it a RESET. Then check to see if it

is protected; if it is, push the PROTECT-UNPROTECT switch in the unprotect position.

4. Now you can check out the different switches and indicators. All address switches should be in the off position. Hold the RESET on-- you should have all the status lights off and all data address lights on. When you release the RESET switch, all the address lights should go off. The MEMR, M1, WO, WAIT lights should be on and whatever data there is in location 0 will be displayed in the data lights.

Now to check the lights and switches for proper operation, turn each address switch on one at a time and make sure that the corresponding address light comes on when EXAMINE switch is operated. What you are doing here is checking for obvious shorts in the address bus area so only one switch should be on at a time.

The data lights should be checked in the same fashion. Only use the lower 8 switches and the DEPOSIT switch to check these.

Checking the EXAMINE NEXT and DEPOSIT NEXT is fairly simple. Just keep pressing them and observe that the address lights count up binarily.
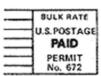
Make sure that PROTECT switch turns on the Protect Status light and that UNPROTECT turns it off. With the PROTECT on you shouldn't be able to change the contents of memory with DEPOSIT or DEPOSIT NEXT (or instructions either).

Now you're ready to try a program. Use the one in the Operator's Manual on pages 33-38. After you load everything in be sure to RESET so that you start from LOC 0. SINGLE STEP through it first to check out the SINGLE STEP switch and then run it. Every time you stop it to examine the results be sure to RESET prior to restarting.